53. (Once Amended) A method as claimed in claim 18 [17], wherein the structure is a building.

REMARKS

The Office Action indicates that claims 45-48 contain allowable subject matter and would be allowable if rewritten in independent form. The Applicant thanks the Examiner for this indication, but declines to amend these claims at this time. Claims 10-13, 16, 18-21, 23, 25, 27-28, 30-32, 34-37, 39-44, and 49-50 have been rejected under 35 USC 103(a) as being unpatentable over Patent No. GB 2,303,444 to Dadachanji ("Dadachanji"). Claims 8, 17, 24, 29, and 51-53 have been rejected under 35 USC 103(a) as being unpatentable over Dadachanji in view of Patent No. DE 195 20 035 to Hellmuth et al. ("Hellmuth").

Claims 24, 25, 27, 28, and 29 have been objected to for failing to further limit the subject matter of the previous claim, since claims 22 and 26 on which they depended, had been previously deleted. These claims have been amended to place them in proper dependent form. Claim 31 is objected to because of a typographical error. Claim 31 and the specification have been amended to correct typographical errors.

THE INFORMATION DISCLOSURE STATEMENT

The Office Action indicates that references 1, 4, 6, 8, 9, 12, 13, 15, 20, 26, and 30 listed on the IDS filed on August 19, 2002, were not considered because of various informalities. The Applicant is submitting a revised Information Disclosure Statement, along with the appropriate fee of $180, with this paper. Copies of the references are not provided herewith, because the undersigned believes the Office already has copies of all the references cited in the revised IDS. Some publication dates were not readily available, and will be updated as soon as possible.

1. Claims 10 and 11 are patentable over Dadachanji

Dadachanji discloses a method and apparatus for detecting moisture. The Office Action notes that "Dadachanji does not specifically disclose the additional steps of performing further testing on the water suspect area and determining whether the water is present based on the further testing." O.A. p. 4. However, Dadachanji not only fails to disclose steps (d) and (e) of claim 10, it specifically teaches away from "contactingly testing the water-suspect area using at least one of a moisture detector, an endoscopic probe, and a resistivity meter; and determining

whether water is present in the structure, based on the testing of said step (d)." Dadachanji teaches that moisture is determined remotely, "without the need to make contact with the surface of [such] walls or parts." Dadachanji, p. 3, 3rd paragraph. In making a rejection, the prior art must be considered in its entirety, including portions that teach away from the claimed invention. See, MPEP §2141.02. For at least this reason, Dadachanji does not render obvious independent claim 10, nor does Dadachanji render obvious claim 11, which is dependent thereon.

2. Claims 12 and 13 are patentable over Dadachanji.

Regarding independent claim 12, as amended, Dadachanji not only fails to disclose "non-contactingly testing the water-suspect area using at least one of a capacitance meter and a moisture detection method including a step of changing a temperature of the structure; [and] determining whether water is present in the structure, based on the testing of said step (d);" Dadachanji also fails to disclose "determining the source of the water." While the Office Action asserts that determining the source of the water would have been an obvious design choice, Dadachanji does not teach or even suggest "non-contactingly testing the water-suspect area using at least one of a capacitance meter, infrared inspection and a moisture detection method including a step of changing a temperature of the structure" or "determining the source of the water using at least one of a litmus paper, a pH meter, and a salinity meter." Nor does any generally available knowledge suggest combining such testing with the use of electromagnetic radiation to detect water in a structure.

No proper motivation is cited for this combination in the Office Action. While the Office Action asserts "that is common in the art (and good engineering practice) to repeat and/or confirm the results of any measurement" and that "it would be obvious for one skilled in the art to take remedial action; these statements are not substantiated with a specific citation to the prior art and neither proposition provides a specific motivation to combine the specific additional steps claimed (and not disclosed in Dadachanji). The Office Action does not support a prima facie conclusion of obviousness for independent claim 12 because all of the claimed steps are not taught or suggested in Dadachanji. Additionally, even assuming that the non-disclosed steps are known in the art, the Office Action fails to provide specific motivation to make the combination claimed. For at least these reasons, Dadachanji does not render obvious independent claim 12, nor does Dadachanji render obvious claim 13, which is dependent thereon.

3. Claims 18-21, 23, 25, 27-28, 30-32, 34-37, 39-44 and 49-50 are patentable over Dadachanji.

Regarding independent claim 12, as amended, Dadachanji fails to disclose "generating with a generator electromagnetic radiation including at least one predetermined exposure wavelength that is **both** significantly absorbed by water **and** is not significantly absorbed by material composing the structure, and at least one predetermined reference wavelength that is **neither** significantly absorbed by water **nor** the material composing the structure." Instead Dadachanji discloses "infrared radiation of, say, two wavelengths, on being a wavelength which is strongly absorbed by water and the other being a wavelength not selectively absorbed by water." Dadachanji makes no mention of absorption characteristics of the infrared radiation regarding the "target." While the Office Action asserts that it is an inherent characteristic of a reference wavelength to not be significantly absorbed by the structure being exposed, even assuming this is true does not teach or suggest the limitation that the exposure wavelength "is **both**_significantly absorbed by water **and** is not significantly absorbed by material composing the structure."

In addition, Dadachanji fails to disclose "determining that the predetermined area includes water if the first and second levels differ by at least a predetermined amount; and determining that the predetermined area includes no water if the first and second levels do not differ by at least the predetermined amount." The Office Action appears to indicate that "to measure the relative strengths of the wavelengths in the reflected radiation to arrive at and indication of the dampness of the surface" discloses making the determination according to the claimed method. However, Dadachanji only discloses determining "an indication of the dampness" and does not disclose determining whether an area includes water or not based on a predetermined amount. Indeed, Dadachanji does not mention the option of determining that water is not present in the target surface.

Dadachanji does not teach or suggest all of the claimed limitations, nor does the Office Action provide specific motivation to make the claimed combination. For at least these reasons, Dadachanji does not render obvious independent claim 18, nor does Dadachanji render obvious claims 19-21, 23, 25, 27-28, 30-32, 34-37, 39-44 and 49-50, which are dependent thereon.

4. Claim 8 is patentable over Dadachanji in view of Hellmuth.

Hellmuth discloses remote measurement of surface moisture of objects. Hellmuth discloses irradiating the object with a 250 or 500 Watt lamp having a broad emission spectrum. Hellumth, like Dadachanji, does not disclose " the predetermined area of the structure exposed in said step (a) being at least one square meter." The Office Action asserts that it would be an obvious design choice to expose areas of greater than one square meter, and as such would be inherent in Dadachanji in order to allow for the structure to be scanned in a reasonable amount of time. However, no art is cited showing that exposing areas of greater than one square meter was possible in the prior art.

The Office Action further implies that a radiation source of 250 or 500 Watts suggests exposing a predetermined area that is at least one square meter. However the wattage, or power, of the lamp is at best tangentially related to the size of the area exposed by the lamp. A radiation source of 250 or 500 Watts only suggests the power of the radiation source. In order to determine the exposure area, one would also need to know the distance between the source and the object exposed, the geometry of the radiation emitted by the source, including any collimation. The English abstract of Hellmuth makes no teaching or suggestion on these issues. The fact that the optical system for the measurement device is adapted for long-range or wide-angle observation is no limitation on the area exposed by the radiation source. Furthermore, neither Dadachanji nor Hellmuth disclose sensing a "second electromagnetic radiation emitted by or transmitted through the predetermined area of the structure and based on the first electromagnetic radiation." Thus, neither Dadachanji, nor Hellmuth, disclose all of the limitations of claim 8. For at least these reasons, claim 8 is patentable over Dadachanji, in view of Hellmuth, and should be allowed.

5. Claim 17 is patentable over Dadachanji in view of Hellmuth.

As discussed above, regarding claim 12, Dadachanji does not teach or even suggest "non-contactingly testing the water-suspect area using at least one of a capacitance meter, infrared inspection and a moisture detection method including a step of changing a temperature of the structure" or "determining the source of the water using at least one of a litmus paper, a pH

meter, and a salinity meter." Hellmuth makes no such disclosure either. For at least this reason, claim 17 is patentable over Dadachanji, in view of Hellmuth, and should be allowed.

6. Claims 24, 29 and 51-52 are patentable over Dadachanji in view of Hellmuth.

As discussed above, regarding independent claim 12, Dadachanji fails to disclose "generating with a generator electromagnetic radiation including at least one predetermined exposure wavelength that is **both** significantly absorbed by water **and** is not significantly absorbed by material composing the structure, and at least one predetermined reference wavelength that is **neither** significantly absorbed by water **nor** the material composing the structure." Hellmuth makes no such disclosure either. For at least this reason, claims 24, 29 and 51-52 are patentable over Dadachanji, in view of Hellmuth, and should be allowed.

CONCLUSION

The undersigned requests reconsideration in light of the comments provided above.

Should the Examiner have any questions regarding this paper or the application itself, the Examiner is invited to contact the undersigned at 202-554-2962.

Attached hereto is a paper entitled Version Without Markings.

Respectfully submitted,

Date: 3-20-03

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Version of the Amendments Without Markings

IN THE SPECIFICATION:

Please replace the paragraph on page 17, beginning at line 5, with the following:

B1

A relatively specific embodiment of the method for determining whether water is present in a structure begins in step S1 of Fig. 5A. In step S2, at least one exposure wavelength is determined to be one that is significantly absorbed by water and not significantly absorbed by the material composing the structure. By way of example and not limitation, the exposure wavelengths can include at least one wavelength at about 0.76, 0.97, 1.19, 1.45, 1.94, 2.55, 2.7, 5.5, or 10.7 micrometers, which are significantly absorbed by water and are generally not significantly absorbed in materials used in structures (for graphs of absorption spectra, see pg. 1957, FT-NIR Atlas, M. Buback and H.P. Vogele, ISBN 3-527-28567-9, VCH Publishers, New York, NY; available on the internet at www.asdi.com). To determine a wavelength that is not significantly absorbed by the material composing the structure, the material composing the structure can be tested with a spectrometer, for example, to determine the absorption spectra of the material at wavelength ranges under consideration for use as the exposure wavelength. By analyzing the material's absorption spectra, an exposure wavelength that is not significantly absorbed by the material can be readily determined. Optionally, the exposure wavelength can be a wavelength that excites emission at an emission wavelength of water.

In step S3, a reference wavelength is determined as a wavelength that is not significantly absorbed by water and is also not significantly absorbed by the material composing the structure. Determination that the reference wavelength is not significantly absorbed by the structure can be performed by using a spectrometer in a manner similar to that used to determine the exposure wavelength. Alternatively, if the detection wavelength is an emission wavelength, the reference

wavelength should be one at which no significant emission from water occurs, and which also is not significantly absorbed by the material composing the structure. For example, the reference wavelength can include at least one wavelength at about 1.06 or 1.66 micrometers, which wavelengths are not significantly absorbed by water.

B1 cont

In step S4, a detection wavelength(s) is determined to be one that is sensitive to the exposure wavelength(s) in the presence of water, and that is not significantly absorbed by the material composing the structure. The detection wavelength can be the same wavelength as the exposure wavelength if absorption is to be used to determine the presence of a water-suspect area, or can be an emission wavelength of water that is excited by the exposure wavelength. Such emission wavelength could include wavelengths of about 3.2 or 6.2 micrometers, for example, in which case the exposure wavelength should be at least one wavelength that is significantly absorbed by water and that is a shorter wavelength than about 3.2 or 6.2 micrometers to ensure that sufficient excitation energy is provided to any water molecules present to excite emission at such wavelengths.

In step S5, the generator 12 is positioned to expose a predetermined area of the structure 16 with the radiation 18 at the exposure and reference wavelengths. Such step can be performed by a human user of the method using the stand 20 that supports the generator 12 and/or a view finder or visible radiation 18 generated by the generator 12, which reveals the area of the structure exposed by the radiation 18. The area of the structure 16 to be exposed by the radiation 18 can be marked with removable chalk or ink, for example, for use in positioning the senor unit 14.

In step S6, the sensor unit 14 is positioned to receive and sense electromagnetic radiation 22 from the predetermined area of the structure 16 to be exposed with the radiation 18. Step S6

can be performed by a human user of the method using the stand 35, optionally with a view finder to align the sensor unit 14 to receive the electromagnetic radiation 18 from the area of the structure exposed by the generator 12. Positioning of the sensor unit 14 can be facilitated if the generator 12 generates radiation 18 to include visible wavelengths, or the area to be exposed by the radiation 18 can be delineated with a marker to permit the user to position the sensor unit 14 to receive radiation 22 from the structure area exposed by radiation 18.

B1 cont

In step S7, the generator 12 generates the electromagnetic radiation 18, including the determined exposure and reference wavelengths. In step S8, the generator 12 exposes the predetermined area of the structure 16 to be analyzed for the presence of a water-suspect area, with the radiation 18, which includes the exposure and reference wavelengths. In step S9, the sensor unit 14 receives the radiation 22 from the exposed predetermined area of the structure 16. The received radiation 22 is based upon (or in other words derived from) the radiation 18 used to expose the structure 16.

In step S10, the sensor unit 14 senses an intensity level of the radiation 22 at the detection wavelength determined in step S4. The sensor unit 14 also senses an intensity level of the reference wavelength determined in step S4 from the radiation 22. In step S11 of Fig. 5B, the intensity levels of the exposure and reference wavelengths are compared.

In step S12, a determination is performed to establish whether the intensity levels of the detection and reference wavelengths differ by a predetermined amount. Preferably, the predetermined amount is at least ten percent (10%) of the reference wavelength's intensity, although this need not necessarily be so as long as the sensor(s) 26 are sufficiently sensitive to distinguish the detection and reference wavelengths' intensity levels if water is present in the exposed area of the structure. If the detection and reference wavelengths differ by the

predetermined amount as determined by the performance of step S12, the method proceeds to step 13 in which a water-suspect area is determined to exist in the structure.

In step S14 of Fig. 5B, testing is performed to determine whether the water-suspect area includes water, or is doe to some other cause such as missing insulation or the presence of different structural materials. The presence of water in the water-suspect area in step S14 can be performed by the method of Figs. 6A and 6B which will be described in detail later in this document. Alternatively, the testing to confirm the presence of water in the water-suspect area can also be performed with a moisture detector such as the model KJE-100 from Zeltex, Inc., of Hagerstown, Maryland. The testing to confirm the presence of water in step S14 can also be performed in numerous other ways, such as those set forth in U.S. Patent No. 5,886,636 issued March 23, 1999 to Patrick J. Toomey, the subject inventor. For example, the water-suspect area can be confirmed as containing water by scanning the water-suspect area with a capacitance meter, and determining whether the water-suspect area includes water, based on the reading of the capacitance meter. Alternatively, the water-suspect area can be confirmed as containing water by positioning an endoscopic probe in the structure in proximity to the water-suspect area, viewing the water-suspect area with the endoscopic probe, and determining whether the water-suspect area includes water, based on the viewing of the water-suspect area. As another alternative, the water-suspect area can be confirmed as including water using spaced conductive pins electrically coupled to a resistivity meter. The pins are inserted or driven into the water-suspect area of the structure, and a signal is applied to one of the pins. The resistivity meter senses the signal level on at least one other pin, and a determination is made to establish whether the water-suspect area of the structure is due to the presence of water, based on the signal level sensed by the resistivity meter. Because the presence of water generally enhances electrical

conductivity in the structure's materials, the less resistance observed between the pins, the more likely water is present, and vice versa.

In step S15 of Fig. 5B, a determination is made to establish whether the water-suspect area in fact includes water, based on the testing performed in step S14. If the determination in step S15 is affirmative, the source of the water is determined in step S16.

B1 cont

Step S16 can be performed in numerous ways, including those disclosed in U.S. Patent No. 5,886,636. More specifically, the source of the water can be determined by detecting the pH of water from the water-confirmed area with a litmus paper or pH meter, determining that the source of the water is not rain if the water is not relatively acidic. Alternatively, the source of the water in the water-confirmed area of the structure 16 can be determined by sensing the salinity of water from the water-confirmed area with a salinity meter, for example, determining that the water-confirmed area is due to ground water if the water is relatively saline, and determining that the water-confirmed are is not due to ground water if the water is not relatively saline. As another alternative, the generator 12 and the sensor unit 14 can be used, for example, in the performance of the method set forth later in this document with reference to Figs. 7, 8A and 8B to determine whether the source of the water in the water-confirmed area of the structure is ground water.

After performance of step S16, or if the determination of either of steps S12 or S15 are negative, the method of Figs. 5A and 5B ends in step S17. Steps S1-S13 can be performed either by the processor 28, the computer 36 or a human user of the method of Figs. 5A and 5B. Steps S14-S17 of Figs. 5A and 5B can be performed by a human user of the method using appropriate equipment and techniques such as those previously described.

IN THE CLAIMS:

Please delete claims 16 and without prejudice to the subject matter therein. Please amend claims as follows:

8. (Twice Amended) A method comprising the steps of:

d) exposing with a generator a predetermined area of a structure with first electromagnetic radiation including at least one predetermined wavelength that is significantly absorbed by water;

e) sensing with a sensor unit second electromagnetic radiation from the structure, the second electromagnetic radiation emitted by or transmitted through the predetermined area of the structure and based on the first electromagnetic radiation; and

f) determining whether the water exists in the structure, based on the second radiation sensed in step (b), the predetermined area of the structure exposed in said step (a) being at least one square meter.

10. (Twice Amended) A method comprising the steps of:

f) exposing with a generator a predetermined area of a structure with first electromagnetic radiation including at least one predetermined wavelength that is significantly absorbed by water;
g) sensing with a sensor unit second electromagnetic radiation from the structure, the second electromagnetic radiation based on the first electromagnetic radiation;
h) determining whether a water-suspect area exists in the structure, based on the second radiation sensed in step (b);
i) if said step (c) determines that the water-suspect area exists in the structure, contactingly testing the water-suspect area using at least one of a moisture detector, an endoscopic probe, and a resistivity meter; and
j) determining whether water is present in the structure, based on the testing of said step (d).

12. (Twice Amended) A method comprising the steps of:

g) exposing with a generator a predetermined area of a structure to electromagnetic radiation including at least one predetermined exposure wavelength significantly absorbed by water, and at least one predetermined reference wavelength that is not significantly absorbed by water;

h) sensing with a sensor unit electromagnetic radiation from the exposed predetermined area of the structure at a predetermined detection wavelength that is sensitive to the exposure wavelength if water is present in the exposed predetermined area of the structure, and that is not sensitive to the exposure wavelength if water is not present in the exposed predetermined area of the structure, and at the reference wavelength;

B3 Contd

i) determining whether the exposed predetermined area of the structure includes a water-suspect area, based on the electromagnetic radiation sensed in said step (b) at the detection and reference wavelengths;

j) if said step (c) determines that a water-suspect area exists in the structure, non-contactingly testing the water-suspect area using at least one of a capacitance meter, infrared inspection and a moisture detection method including a step of changing a temperature of the structure;

k) determining whether water is present in the structure, based on the testing of said step (d); and

l) if water is present in the water-suspect area, determining the source of the water using at least one of a litmus paper, a pH meter, and a salinity meter.

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18. (Twice Amended) A method comprising the steps of:

B4

g) generating with a generator electromagnetic radiation including at least one predetermined exposure wavelength that is both significantly absorbed by water and is not significantly absorbed by material composing the structure, and at least one predetermined reference wavelength that is neither significantly absorbed by water nor the material composing the structure;

h) exposing with the generator a predetermined area of the structure with the generated electromagnetic radiation;

i) sensing with a sensor unit at least a portion of the generated radiation from the exposed area of the structure to determine a first intensity level of the radiation at the exposure wavelength, and a second intensity level at the reference wavelength;

B4 cont

j) comparing the first and second intensity levels;

k) determining that the predetermined area includes water if the first and second levels differ by at least a predetermined amount; and

l) determining that the predetermined area includes no water if the first and second levels do not differ by at least the predetermined amount.

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24. (Once Amended) A method as claimed in claim 18, wherein the generator produces the radiation used to expose the structure with a power of between ten and one-thousand Watts.

B5

25. (Once Amended) A method as claimed in claim 18, wherein the generator is supported in a fixed position during the performance of said step (b) with a photographic stand.

27. (Once Amended) A method as claimed in claim 18, wherein the sensor unit includes a spectrometer.

28. (Once Amended) A method as claimed in claim 18, wherein the sensor unit includes a spectroradiometer.

29. (Once Amended) A method as claimed in claim 18, wherein the sensor unit includes a hyperspectral imaging system.

B4

31. (Twice Amended) A method as claimed in claim 18, wherein the reference

B6 concl'd

wavelength includes at least one of wavelengths at about 1.06 and 1.66 micrometers, such wavelengths not significantly absorbed by water.

51. (Once Amended) A method as claimed in claim 18, wherein the predetermined area of the structure exposed in said step (b) is at least one square meter.

B7

52. (Once Amended) A method as claimed in claim 18, wherein the structure is a house.

53. (Once Amended) A method as claimed in claim 18, wherein the structure is a building.